By: Michael Chang   ID: 301329253   Date: March 7, 2021

Part I: Essay Question: Proposal

Title: Which graphics cards to purchase for mining cryptocurrency?

Table 1[4][7]: GPU data and specifications for mining cryptocurrency

GPU	Hash Rate (MH/s)	Power (W)	Price (CAD)
Nvidia RTX 3090	121	350	$2050
AMD Radeon VII	105	300	$2380
Nvidia RTX 3080	97	320	$1100
Nvidia CMP 90HX	86	320	$1000
Nvidia RTX 2080 Super	45	250	$1900
AMD RX 6900 XT	61	350	$1600
Nvidia GTX 1080 Ti	49	250	$2400
Nvidia Titan XP	49	250	$1650

When it comes to purchasing the right graphics cards (GPU) for crypto mining Ethereum (we will not evaluate other cryptocurrencies in this essay), it is important to find a GPU that has a good performance and in a reasonable price. Based on Table 1, Nvidia RTX 3080 is highly recommended for those who want to do crypto mining because it is affordable and provides a good amount of hash rate.

A good graphics card (GPU) can be used for providing faster processing transaction of Ether (Ethereum currency measure in ETH [11]). Because there is no centralized bank for storing and transferring digital currency in crypto mining, miners are required to verify each transaction by solving problem that require a lot of computing power. Once they solved the problem, they are rewarded with a portion of the Ether from that transaction [6]. This is a way to gain Ether without putting actual money into the system. Because GPU provides more computing power, it can help those miners to earn more Ether by solving more questions faster to verify more transactions.

In order to help miner to successfully gain as much Ether as possible, the miner must have a GPU that has a good amount of hash rate, which is the computing power that is used to mine Ether and process the transaction. As a GPU has more hash rate, the more transactions the GPU can verify in order to receive more Ether. In Nvidia RTX 3080, it has a hash rate of 97 MH/s, and one Ether is $1740 Canadian Dollars (CAD). Based on the calculation from the Ether Mining Calculator [1], a single Nvidia RTX 3080 can help miners to earn around $114.39 (CAD) per month without including the electricity cost. For the electricity cost, the cost per kWh is $0.093 according to BC Hydro, and the power consumption of the Nvidia RTX 3080 is 320W. According to the calculation below, the electricity cost is $21.43 per month.

Calculating Electricity Cost [7]

Power cost = Power Consumption * Cost per kW/h * number of days (hours)

Ex. Calculating the Monthly cost (30 days = 720 hours)
320 Watts * $0.0093/ (kW * hr) * 1kW/1000W * 30 days
= 0.32kW * $0.0093 kW/hr * 720 hr = $21.4272 = $21.43 per month

Table 2[1]: Ether Mining Profit with 1 single Nvidia RTX 3080 (Hash rate: 97MH/s, Power Consumption: 320W)

Duration	Ether Earned (CAD)	Power Cost (CAD)	Profit (CAD)
Per Hour	$0.20	$0.02976	$0.17
Per Day	$4.83	$0.71424	$4.12
Per Week	$33.78	$4.99968	$28.78
Per Month	$144.75	$21.4272	$123.32

Table 3[1]: Ether Mining Profit with 2 Nvidia RTX 3080 (Hash rate: 194MH/s, Power Consumption: 640W)

Duration	Ether Earned (CAD)	Power Cost (CAD)	Profit (CAD)
Per Hour	$0.40	$0.05952	$0.34
Per Day	$9.65	$1.42848	$8.22
Per Week	$67.55	$9.99936	$57.55
Per Month	$289.51	$42.8544	$246.66

Table 4[1]: Ether Mining Profit with 10 Nvidia RTX 3080 (Hash rate: 970MH/s, Power Consumption: 3200W)

Duration	Ether Earned (CAD)	Power Cost (CAD)	Profit (CAD)
Per Hour	$2.01	$0.2976	$1.71
Per Day	$48.25	$7.1424	$41.11
Per Week	$337.76	$49.9968	$287.76
Per Month	$1447.54	$214.272	$1233.27

Table 5[4][7]: Computer Hardware Cost

Computer Hardware	Purpose	Price (CAD)
Motherboard	• It connects all the computer components together	$500
CPU (Central Processing Unit)	• The brain of the computer • Processor that helps computer to take in and run instructions [9]	$250
Memory (RAM)	• Provide memory to allow the computer to multitask between different applications • RAM – Random Access Memory	$200
Hard Drive	• Storage of the computer that stores data and other digital contents	$150
Power Supply Unit (PSU)	• Provides the power to the computer	$100
Rackmount Frame	• It holds GPUs which allow for modular expansion to be stacked on	$150
PCI-e Riser	• It mounts the GPU into the frame	$10
Nvidia RTX 3080 (GPU)	• Co-processor for mining cryptocurrency	$1100
	Total Cost	$2460

For those who want to do crypto mining with strict limited income, it is highly recommend buying one GPU. Nvidia RTX 3080 is a great choice for them primarily because of its affordability ($1100). Although Nvidia CMP 90HX is the cheapest GPU ($1000) out of the rest of Table 1, its hash rate is lower than RTX 3080. Nvidia RTX 3080 has the third highest hash rate in Table 1, which it outperforms six other GPUs where five of them are less affordable with lower performance. Even though having 10 Nvidia RTX 3080 can help them earn over $1233.27 per month, it is crucial to take consideration of the total cost of ten GPU ($11000). If we also include the cost of other hardware components (see Table 5), the total cost will be $12360, which can pay around three semesters of tuitions (assuming tuition is around $3000-$4000 per semesters). If people decide to use the Ether that they earn from mining to pay back the total cost, it will take at least ten months assuming that the value of Ethereum stays the same. People will also have to pay for the electricity cost of around $214.27 per month, while they can just pay $21.43 per month with one GPU.

Confusing

economy of scale

Conclusion? *what is performance?*

Nvidia RTX 3080 has shown to be the best GPU for people who are on a tight budget and still want a good performance. Many people tend to assume that GPU are only for providing better graphics for ~~online~~ gaming, but the ~~similar~~ technology can also be applied to mining cryptocurrency through verifying transaction and solving problems. Therefore, people can take advantage of the service provide by the GPU to help them mine Ether and make the non-centralized banking into a reality.

missing discussion

References:

[1] Etherscan. "Ether Mining Calculator" https://etherscan.io/ether-mining-calculator (accessed Mar 4, 2021)

[2] S. Seth. "GPU Usage in Cryptocurrency Mining" https://www.investopedia.com/tech/gpu-cryptocurrency-mining/#:~:text=Courtesy%20of%20these%20ALUs%2C%20the,like%20those%20of%20the%20CPU. (accessed Mar 4, 2021)

[3] A, Hertig and O, Leech. "What Does Hashrate Mean?" https://www.coindesk.com/what-does-hashrate-mean. (accessed Mar 4, 2021)

[4] Minerstat, "GPU mining" https://minerstat.com/hardware/gpus (accessed Mar 4, 2021)

[5] E, Hong and J, Mansa, "How Does Bitcoin Mining Work?" https://www.investopedia.com/tech/how-does-bitcoin-mining-work/ (accessed Mar 4, 2021)

[6] Fireship, "Bitcoin ₿ in 100 Seconds // Build your Own Blockchain" https://www.youtube.com/watch?v=qF7dkrce-mQ&t=303s (accessed Mar 4, 2021)

[7] M, Tofiloski, "Midterm Exam", CMPT 376W D200 , Simon Fraser University, Feb 28, 2021

[8] CNBC, "How Much It Costs To Mine For Cryptocurrency" https://www.youtube.com/watch?v=rnMPy4LTsxA (accessed Mar 6, 2021)

[9] ScienceDirect, "Central Processing Unit" https://www.sciencedirect.com/topics/engineering/central-processing-unit (accessed Mar 4, 2021)

[10] A. K. Hughes, "Bitcoin mining 101: How to build a Cryptomining rig" https://www.zdnet.com/article/how-to-build-a-cryptomining-rig/ (accessed Mar 4, 2021)

[11] J. Frankenfield and S. Anderson, "Ethereum" https://www.investopedia.com/terms/e/ethereum.asp (accessed Mar 4, 2021)

Part II: Rewrite

In computing, just-in-time (JIT) compilation (also dynamic translation or run-time compilations) is a way of executing computer code that involves compilation when the program is being execute. Most often, this consists of source code or more commonly bytecode translation to machine code, which is then executed directly. A system implementing a JIT compiler will analyse the code that is being executed and identifies parts of the code that can speedup to optimize the performance of compiling the program.